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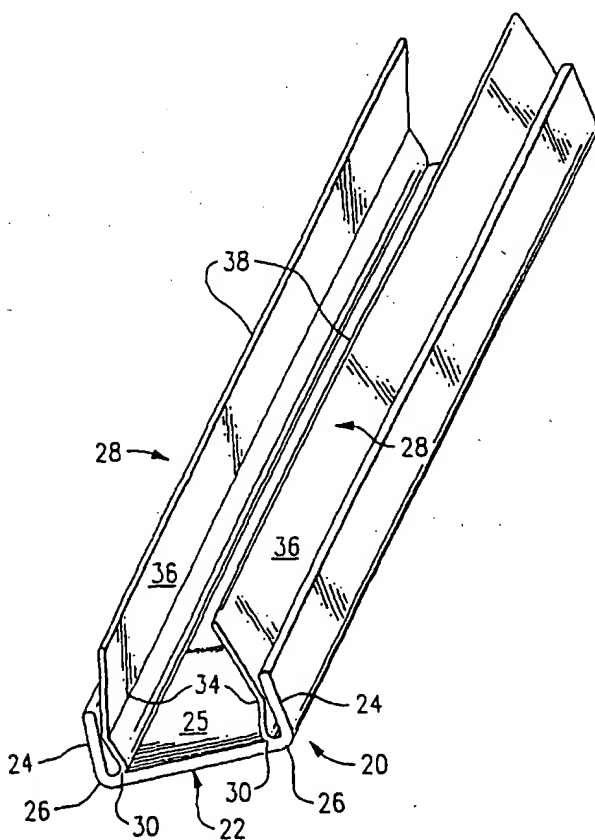
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(54) Title: **EXTRUDED CHANNEL FOR INSULATING PANEL CONSTRUCTION**



(57) Abstract: A one-piece extruded plastic channel (20) is configured to support two planar panels having a predetermined thickness in substantially parallel spaced relationship by receiving free edges of the panels therein. Each channel includes an elongated U-shaped section, which includes a flat intermediate section (22) having an axial length and a lateral width and defining lateral edges spaced by the lateral width. The U-shaped section further includes a pair of substantially rigid outer walls (24), one of which extends from each of the lateral edges of the intermediate section. The U-shaped section further includes a pair of flexible inner walls (28), each of which extends from a junction (30) with the intermediate section at a position adjacent to and spaced laterally inwardly from one of the outer walls.

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EXTRUDED CHANNEL FOR INSULATING PANEL CONSTRUCTION

Technical Field

The invention relates to an extruded channel element, which
5 forms the perimeter of an insulating wall panel formed from a pair of
spaced outer panels having foamed insulating material injected
therebetween.

Background Art

Residential and commercial air conditioners include air
10 handling units which include as a part thereof a heat exchanger and a fan
which cooperate to direct air to be heated and/or cooled across the heat
exchanger for direction to an enclosed area to be heated and/or cooled. It is
well known to make such air handling units in a modular manner wherein
the modular units have common dimensions which allow them to be
15 assembled in a variety of combinations depending upon the size of the
installation and the location of the installation. The basic modules of such
a system include a fan module, which typically includes a centrifugal fan
and motor assembly, and a coil module which includes a heat exchange
coil, and usually a filter of some type.

20 Typical modular construction includes a substantially
rectangular framework, which supports the inner components of the
module and also supports outer walls for enclosing the components. It is
also considered desirable for the outer walls to be made from a structural,
noncorrosive, material which has a high insulating value.

25 In order to accomplish this is it known to make such panels
from a so-called "sandwich" construction having outer planar walls

supported in spaced relationship by a suitable outer perimeter structure to define a region therebetween into which an insulating material is placed or injected.

It is further considered desirable for such panels to have structural integrity, and to be formed from a minimal number of components.

Disclosure of the Invention

According to the present invention, a one-piece extruded plastic channel is configured to support two planar panels having a predetermined thickness in substantially parallel spaced relationship by receiving free edges of the panels therein. Each channel includes an elongated U-shaped section, which includes a flat intermediate section having an axial length and a lateral width and defining lateral edges spaced by the lateral width. The U-shaped section further includes a pair of substantially rigid outer walls, one of which extends from each of the lateral edges of the intermediate section. The U-shaped section further includes a pair of flexible inner walls, each of which extends from a junction with the intermediate section at a position adjacent to and spaced laterally inwardly from one of the outer walls. Each of the inner walls has a first length which extends from its junction with the intermediate wall in a lateral direction toward its adjacent outer wall and terminates at a location spaced from the adjacent outer wall by a distance substantially less than the thickness of the panels. Each of the inner walls further includes a second length, which extends from the termination of the first length in the direction away from the adjacent outer wall.

Brief Description of the Drawings

The invention may be better understood and its objects and advantages will become apparent to those skilled in the art by reference to the accompanying drawings, in which:

5 Figure 1 is a perspective view of a fan coil module having removable outer panels constructed using the extruded channels of the present invention;

Figure 2 is a sectional view taken along the line 2-2 of Figure 1;

10 Figure 3 is a fragmented view showing the extruded channel of the present invention and its cooperation with outer panels during different steps of assembly of a wall panel; and

Figure 4 is a perspective view of the channel of the present invention.

Best Mode For Carrying Out The Invention and Industrial 15 Applicability

A fan module 10 for use with an air handling unit having removable outer panels 12 fabricated using the extruded channels according to the present invention is illustrated in Figure 1. The coil module 10 includes a substantially rectangular casing defined by a structural framework having eight corner connectors 14 interconnected by a plurality of horizontally and vertically extending structural elements 16.
20 The framework defined by the corners 14 and the structural elements 16 is adapted to removably receive a plurality of the removable outer panels 12, as is well known in the art. The panels may serve to close off an entire
25 section of the module 10 or may contain openings configured to be aligned in flow communication with components of the fan module, as provided in

the panel removed from the fan module illustrated in Figure 1.

Looking now at Figures 2, 3 and 4, the removable outer panels 12 of the present invention are basically comprised of a pair of thin exterior walls 18 fabricated from a suitable metal or plastic material such as vinyl or the like which is strong and which facilitates easy cleaning of both the inner and outer walls of the panels 12. The outer walls are supported in a predetermined spaced relationship by extruded channel elements 20 according to the present invention.

As will be appreciated as the description continues, the channels 20 receive the exterior walls 18 therein to support them in a fixed spaced relationship to define an inner space between the exterior walls into which an insulating material, such as polyurethane, is injected following assembly of the exterior walls 18 to the extruded channels. Such construction, as a result of the unique configuration of the extruded channels 20 results in a structurally integrated unit including the exterior walls 18, the extruded channels 20 extending about the periphery thereof and the inner polyurethane foam which interlock with one another to maintain the structural integrity of the unit without any further fasteners required.

Looking now at the extruded channels 20 in detail, the channels include an elongated U-shaped section defined by a rigid flat intermediate section 22 having two substantially perpendicularly extending rigid outside walls 24 extending from the lateral edges 26 thereof.

Extending from the upper surface 25 of the intermediate sections 22, within the U-shaped space, are a pair of flexible inner walls 28, each of which originates at a junction 30 integral with the intermediate

wall 22 and which is spaced from its adjacent outer wall 24 by a distance greater than the thickness "t" of the exterior walls 18. The flexible inner walls 28 each includes a first section 32, which extends from the junction 30 in a direction upwardly and towards its adjacent outer wall 24 where it
5 terminates at a location 34 spaced from the adjacent outer wall 24 by a distance less than the thickness "t" of the exterior walls 18.

Each of the flexible inner walls 28 has a second section 36 thereof which extends from the termination point 34 of the first section 32 and which extends upwardly and laterally inwardly away from the outer
10 walls 24 of the channel 20. The second sections 36 extend to a height substantially higher than the outer walls 24 where they terminate at a free end 38. The free end 38 of the second sections 36 also is positioned laterally inwardly from junction 30 of the flexible inner wall 28 with the intermediate section 22.

15 Looking now at Figure 3, the left-hand side of this figure illustrates the above-described structure with an exterior wall 18 vertically positioned above the outer wall 24 and the flexible wall 28 of the channel 20 prior to engagement therewith. As the exterior wall 18 is pushed downwardly into engagement with the walls 24 and 28, the end 40 of the
20 exterior wall engages the second section 36 of the flexible wall and displaces it further laterally inwardly as the exterior wall 18 is displaced downwardly into its final position as illustrated in the right-hand side of Figure 3. As so installed, the exterior wall 18 permanently deflect the flexible walls 28 such that the second sections 36 extend at an even greater
25 angle laterally inwardly with respect to its original position, as illustrated in the left-hand side of Figure 3.

Following such assembly of the exterior walls 18 to the channels 20 to completely enclose the periphery of the spaced exterior walls, polyurethane foam insulation 21 is then injected into the confined space defined by the walls 18 and the channels 20. As illustrated in Figure 1, the foam flows into the entire region where the joint between the exterior walls and the channels is formed and forms a locking engagement between the walls 18 and the channel as a result of the angularly disposed position of the two second sections 36 of the flexible wall 28.

The resulting wall structure, as mentioned hereinabove, is structurally complete and requires no additional mechanical or other adhesive-type fasteners to provide a structurally integral unit which may be installed and removed to an air handling unit as required during the lifetime of the unit. It should be appreciated that in the preferred embodiment, the U-shaped channels 20 have a width, as measured from the outside of the outer walls 24, of 25mm or approximately one-inch. Other dimensions, of course, may be used with equal success.

CLAIMS

1. A one-piece extruded plastic channel configured to support two planar panels in substantially parallel spaced relationship by receiving free edges of the panels therein, each of the panels having a predetermined thickness, said channel comprising:

an elongated U-shaped section which includes a flat intermediate section, which has an axial length and a lateral width, said intermediate section defining lateral edges spaced by said lateral width;

said U-shaped section further including a pair of substantially rigid outer walls, one of said outer walls extending from each of said lateral edges of said intermediate section; and

a pair of flexible inner walls, each of said inner walls extending from a junction with said intermediate section at a position adjacent to and spaced laterally inwardly from one of said outer walls, each of said inner walls having a first length, which extends from its junction with said intermediate wall, in a lateral direction towards its said adjacent outer wall and terminating at a location spaced from said adjacent outer wall by a distance substantially less than the thickness of said panels;

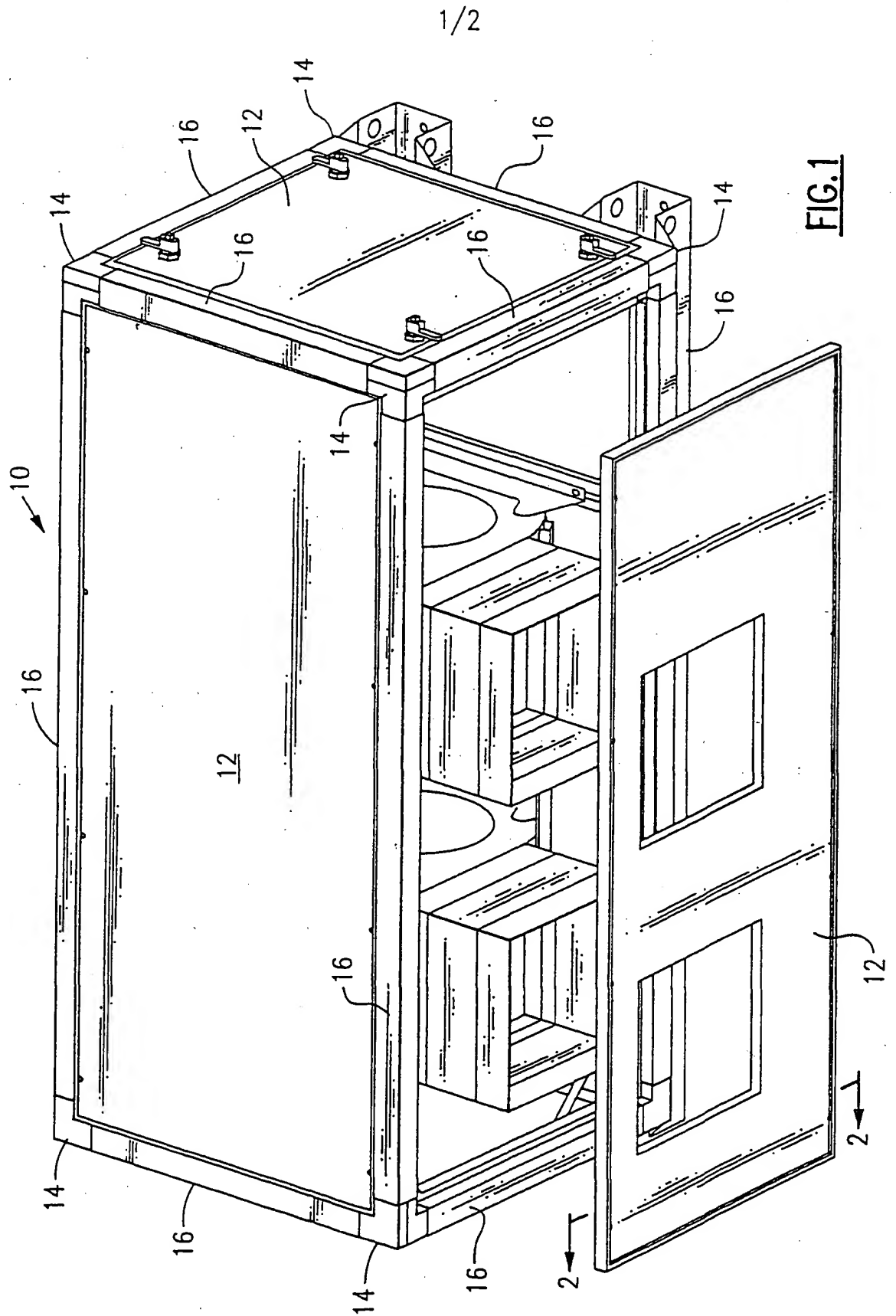
each of said inner walls having a second length which extends from said termination of said first length in a direction away from said adjacent outer wall.

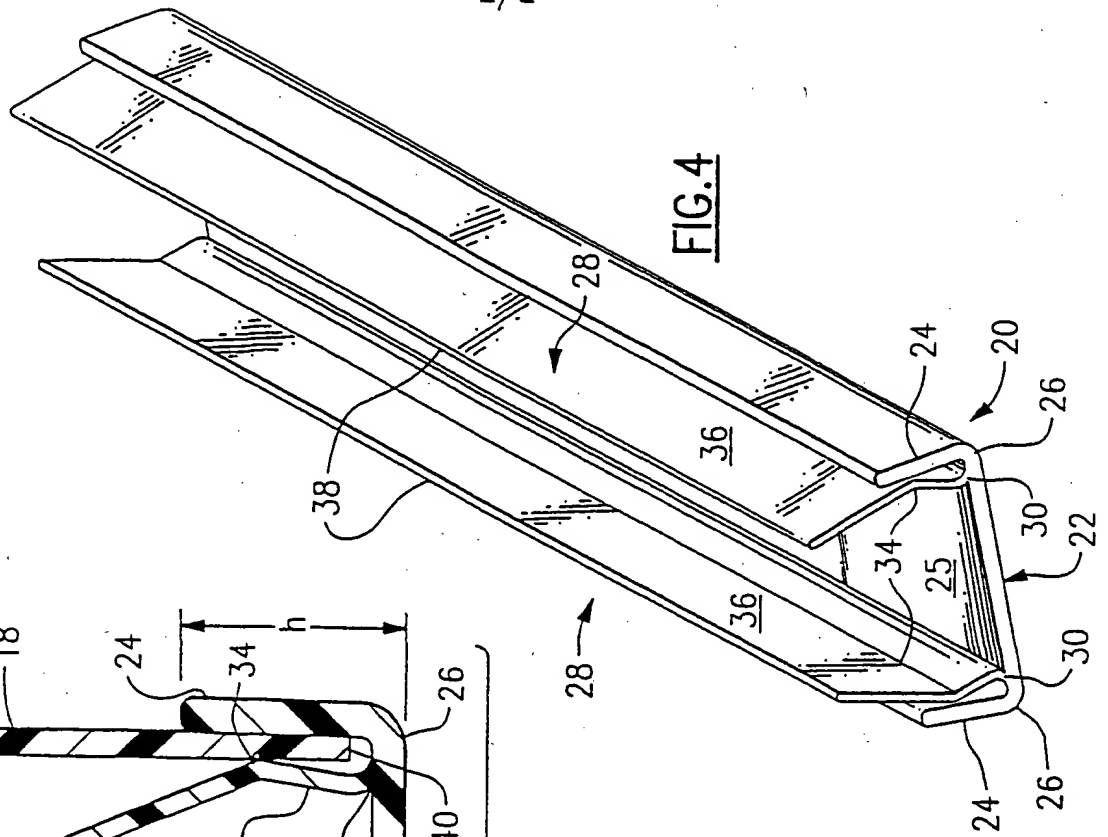
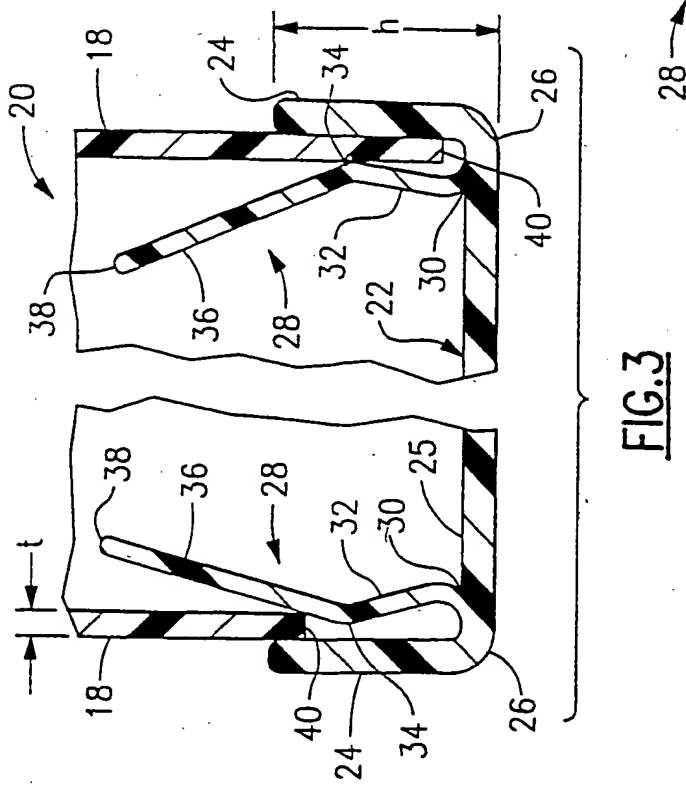
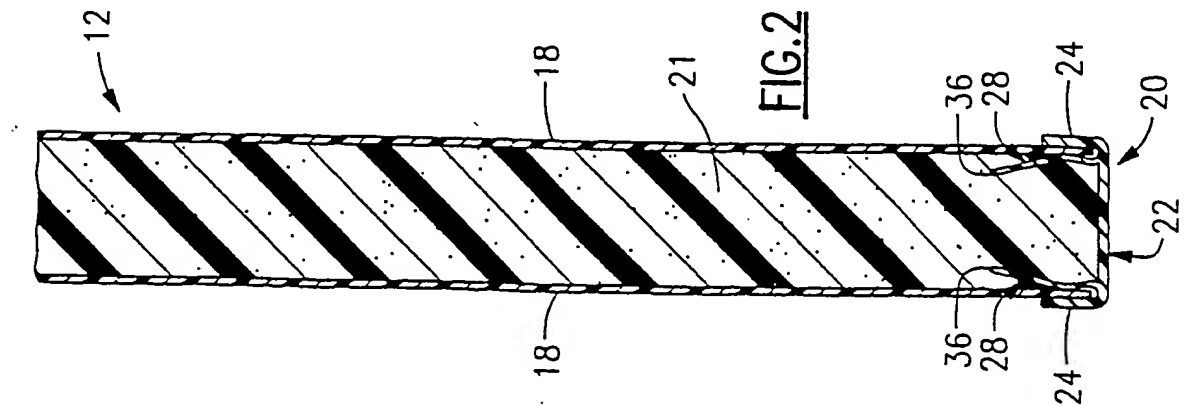
2. The extruded plastic channel of claim 1 wherein each of said outer walls extends substantially perpendicularly from said intermediate section and has a predetermined height measured with respect to said intermediate section;

wherein said termination of said first length of said inner walls is at a height with respect to said intermediate section, which is less than said predetermined height of said outer walls, and wherein said second lengths of said inner walls extend to a height substantially higher than said
5 predetermined height of said outer walls.

3. The apparatus of claim 2 wherein said junction of said flexible inner walls with said intermediate section is spaced from said outer walls by a distance greater than said predetermined thickness of the wall panels; and

10 wherein said second length of said inner walls terminates at a location which is spaced from said outer walls by a distance greater than said junction of said flexible inner walls.





INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F24F F16B E04C E04B E04D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 94 24493 A (EMAIL LTD) 27 October 1994 (1994-10-27) the whole document ---	1-3
A	EP 0 644 305 A (ULTRAFRAME PLC) 22 March 1995 (1995-03-22) the whole document ---	1
A	US 4 361 994 A (CARVER TOMMY L) 7 December 1982 (1982-12-07) -----	

☐ Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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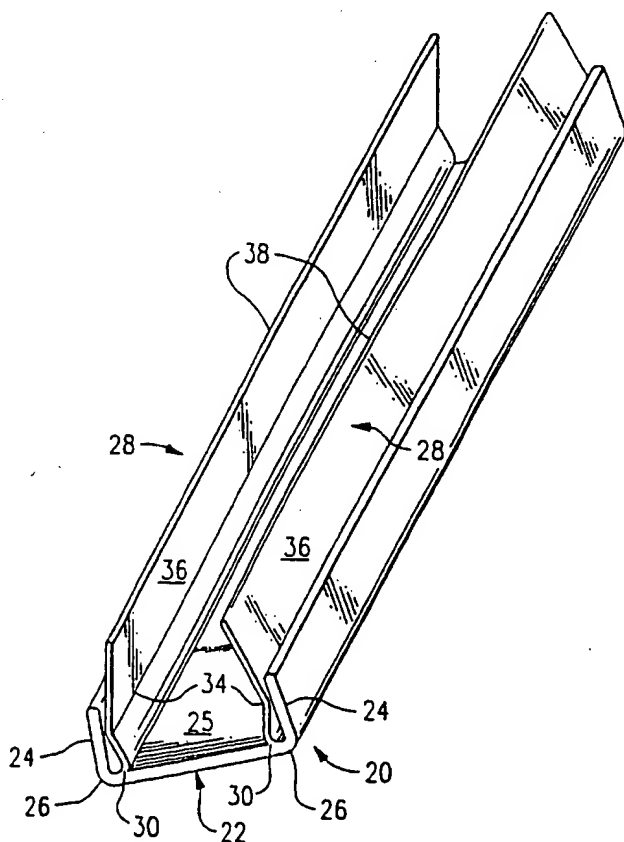
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- (71) Applicant (for all designated States except BR, US): **CARRIER CORPORATION** [US/US]; Carrier Parkway, P.O. Box 4800, Syracuse, NY 13221 (US).
- (72) Inventor; and
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- (74) Agent: **MOMSEN, LEONARDOS & CIA.**; 10th floor, Rua Teófilo Ottoni, 63, CEP-20090-080 Rio de Janeiro, RJ (BR).
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